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(54) **Support system for paper magazine.**

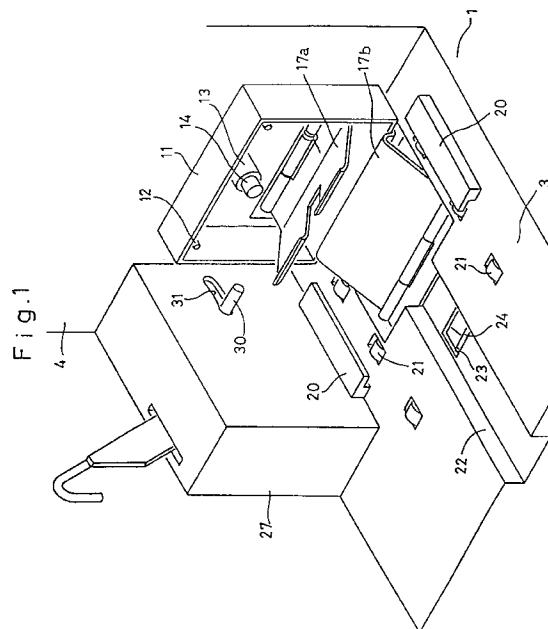
(57) A support system for paper magazine comprises :

- a support surface 3 ;
- a paper feeder box 4 ;
- an upper paper guide 17a and a lower paper guide 17b both arranged over the support surface 3 before the paper inlet of the paper feeder box 4 ;

- a pair of magazine guides 20 mounted on the support surface 3 for guiding both sides of the paper magazine 2 during the loading ;

- a lock cam 24 for swing movements to engage with and disengage from the cam engaging projection of the paper magazine 2 and urged by the yielding force of a spring to press the cam engaging projection towards the paper feeder box 4 ; and

- a lever holding mechanism 33 for holding the lock cam 24 in its unlock position after the return movement of a swing arm 28 is completed.



BACKGROUND OF THE INVENTION

The present invention relates to a support system for supporting a paper magazine carrying a roll of photographic printing paper.

There are known photograph printers for exposing a tape of photographic paper (referred to as a paper) to optical images of a negative film and subjecting it to developing process for reproducing photographic images. In the operation of printing, the paper wound on a reel is commonly stored in and drawn out from a paper magazine which is loaded on to the enclosure of an exposure unit.

The paper magazine needs to be supplied with a new roll of the paper upon consumption of the paper. Also, when a different print size is requested, the paper magazine has to be replaced with one suited for the size. It is therefore essential to provide a support system for easing the loading and unloading of the paper magazine on the enclosure.

In a prior art system, a vertically placed paper feeder box for communication with the paper magazine and a pair of magazine guides for guiding the passage of the paper magazine are provided on an approximately horizontal support surface. For loading, the paper magazine is moved along and between the two magazine guides to the paper feeder box so that a paper outlet arranged in the upper front end of the paper magazine comes to face a paper inlet provided in the upper feeding side of the paper feeder box.

When the paper magazine is placed in its loaded position, it is locked by a locking mechanism.

The paper inlet of the paper feeder box of the prior art system is located in the upper feeding side of the same. The leading end of the paper released from the paper output of the paper magazine tends to go downward as having been wound on a reel and has to be lifted up by hand to feed into the paper inlet of the paper feeder box while the paper magazine being advanced on the support surface to its loading position towards the paper feeder box. This loading action will require a considerable length of time with troublesome adjustment.

In addition, the paper outlet of the paper magazine is also located in the upper front side of the same. If the paper magazine is tilted due to mechanical gaps between the feet of the paper magazine and the magazine guides, its paper outlet comes in disalignment with the paper inlet of the paper feeder box thus preventing the leading end of the paper from feeding from the paper inlet to a pair of advance rollers in the paper feeder box. As the paper magazine is biased between the two magazine guides due to the mechanical gaps, it will hardly permit a feeding action of the paper with a desired accuracy.

It is an object of the present invention to provide a support system for a paper magazine in which a pa-

per is accurately transferred.

SUMMARY OF THE INVENTION

For elimination of the foregoing drawbacks, a support system according to the present invention comprises a support surface of an enclosure of an exposure unit on which a paper magazine having a paper outlet provided in the lower front side thereof and a cam engaging projection mounted to the bottom side thereof, a paper feeder box disposed vertically at the front end of the support surface, two, upper and lower, paper guides arranged over the support surface before the paper inlet of the paper feeder box and urged by springs for vertical swing movements, a pair of magazine guides mounted on the support surface for guiding both sides of the paper magazine during the loading, a lock cam mounted between the two magazine guides and below the support surface for swing movements to engage with and disengage from the cam engaging projection of the paper magazine and urged by the yielding force of a spring to press the cam engaging projection towards the paper feeder box, a swing arm provided beside the passage of the paper magazine for return movement by the yielding force of a spring which is triggered by the loading of the paper magazine, and a lever holding mechanism for holding the lock cam in its unlock position after the return movement of the swing arm is completed.

For loading, the paper magazine is advanced along the magazine guides towards the paper feeder box with the leading end of the paper being released out from the outlet of the paper magazine. When the paper magazine comes to just before its loading position, the leading end of the paper is correctly fed into the paper inlet of the paper feeder box as being guided by the two, upper and lower, paper guides.

As the paper magazine is further advanced to its loading position, it causes the upper and lower paper guides to retract upward and downward respectively.

Simultaneously, the swing arm is pressed forward by the paper magazine for return action thus allowing the lever holding mechanism to release the lock cam. Then, the lock cam comes into engagement with the cam engaging projection of the paper magazine as being moved upward by the yielding force of the spring. Finally, the cam engaging projection remains pressed towards the paper feeder box by the lock cam in the loading mode.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a support system showing one preferred embodiment of the present invention;

Fig. 2 is a longitudinally cross sectional view of the same;

Fig. 3 is a cross sectional side view of the same;
 Fig. 4 is a perspective view of a lever holding
 mechanism of the same;
 Fig. 5 is a cross sectional view of the lever holding
 mechanism of the same;
 Fig. 6 is a cross sectional view of the lever holding
 mechanism in a lock movement; and
 Fig. 7 is a cross sectional view showing the load-
 ed state of a paper magazine.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

One preferred embodiment of the present invention will be described referring to the accompanying drawings.

As shown in Figs. 1 to 3, there are provided a paper magazine 2 placed on the substantially horizontal support surface 3 of an enclosure 1 in which an exposure unit is installed and a paper feeder box 4 disposed upright at the front end of the support surface 3.

The paper magazine 2 contains a paper roll R therein and has an annular recess 5 arranged in the front side thereof and a paper outlet 6 provided in the lower front thereof to be surrounded by the annular recess 5, as illustrated in Fig. 7.

The paper magazine 2 has two flanges 7 mounted to both the lowermost sides thereof respectively and a cam engaging projection 8 mounted to the rear bottom thereof, as shown in Fig. 2.

The paper feeder box 4 has an upper paper guide 9a, a lower paper guide 9b, and two, upper and lower, advancing rollers 10 disposed therein, as shown in Fig. 2. Also, a light blocking frame 11 is mounted to the front side of the paper feeder box 4 for insertion into the annular recess 5 of the paper magazine 2. The positioning of the frame 11 to the paper magazine 2 is determined by a plurality of positioning pins 12 and the guide tube 13 mounted inside the frame 11 on the paper feeder box 4. The guide tube 13 accommodates a plunger pin 14 urged outwardly by a spring 15.

A paper inlet 16 is provided beneath the light blocking frame 11 in the front side of the paper feeder box 4. Also, two, upper and lower, paper guides 17a, 17b are disposed in the front of the paper inlet 16.

The upper paper guide 17a is coupled at proximal end with the upper paper guide 9a inside the paper feeder box 4 for pivotal movement and remains held by an unshown stopper(s) so as to tilt up giving a front-down slope. The upper paper guide 17a is urged against the stopper(s) by the yielding force of a spring 18.

The lower paper guide 17b is pivotably mounted at proximal end and remains urged upwardly by a spring 19 so that its distal end is pressed against the lower side of the light blocking frame 11.

As shown in Figs. 1 and 3, two magazine guides 20 are mounted on the support surface 3 for guiding the movement of the flanges 7 of the paper magazine 2.

There are a row of guide rollers 21 disposed beneath each the magazine guide 20. The guide rollers 21 are embedded such that their head portions only are projected from the support surface 3 to rotate as the paper magazine 2 travels directly thereon.

A guide recess 22 is provided between the two magazine guides 20 in the support surface 3 of the enclosure 1. The guide recess 22 has at center an opening 23 therein through which a lock cam 24 is addressed. The lock cam 24 is fixedly mounted to a shaft 25 disposed beneath the support surface 3 so that it can be moved to and from the guide recess 22 by the forward and reverse actions of the shaft 25. When the lock cam 24 is moved to the guide recess 22, it comes to direct engage with the cam engaging projection 8 of the paper magazine 2.

Also, the lock cam 24 remains urged in the direction of engagement by a spring 26 mounted on the shaft 25 and upon being engaged with the cam engaging projection 8, presses it towards the paper feeder box 4.

A lever casing 27 is mounted at one side of the passage of the paper magazine 2 along the two magazine guides 20. As shown in Fig. 5, there is provided a swing arm 28 in the lever casing 27.

The swing arm 28 is pivotably mounted at upper end to a support pin 29 and has a center pin 30 mounted at the center thereof. The center pin 30 extends outwardly through an arcuate slot 31 provided in the inner or paper magazine side of the lever casing 27 to the passage of the paper magazine 2. The swing arm 28 remains biased by a spring 32 so that the center pin 30 stays at one end of the arcuate slot 31.

Particularly, the lock cam 24 is maintained in its unlock position by a lever mechanism 33 in the lever casing 27 which is actuated by the swing arm 28. The lever mechanism 33 comprises a lever 34 mounted at one end to the shaft 25, an engaging pin 35 mounted to the other end of the lever 34, and an engaging arm 36 disposed above the lever 34 for swing action about a pin 37. The engaging arm 36 has a notch 38 provided in a lower region thereof and a curved guiding edge 39 at the lower end thereof. The engaging arm 36 remains urged against a stopper 41 by a spring 40 while its notch 38 holds the engaging pin 35 of the lever 34 thus to retain the lock cam 24 at its unlock position.

The engaging arm 36 has a pin 42 mounted to a lower region thereof. A pusher plate 44 is mounted at center by a pin 43 to a lower region of the swing arm 28 and coupled at one or stopper end with a spring 45 so that it is urged by the spring 45 against a stopper 46 mounted on a lower region of the swing arm 28. Accordingly, when the swing arm 28 is actuated by the

forward movement of the paper magazine 2, its pusher plate 44 presses the pin 42 of the engaging arm 36 to allow the engaging pin 35 to disengage from the notch 38.

The shaft 25 is coupled at distal end with one end of a link arm 47 which is linked at the other end to the lower end of a handle arm 48. The upper end of the handle arm 48 is projected outwardly from an opening 49 provided in the upper side of the lever casing 27, as shown in Fig. 6. A handle 50 is mounted to the upper end of the handle arm 48.

For loading the paper magazine 2 onto the support surface 3 of the enclosure 1, the leading end of the paper P is fed out from the paper roll R and the paper magazine 2 is advanced towards the paper feeder box 4 with its flanges 7 running along the magazine guides 20.

Fig. 2 shows that the paper magazine 2 is advanced just before reaching the positioning pins 12 while the leading end of the paper P fed out from the paper outlet 6 being guided with the upper and lower paper guides 17a, 17b.

As the paper magazine 2 is advanced further, it presses against the upper and lower paper guides 17a, 17b which are thus lifted up and down respectively.

At the time, the leading end of the paper P is passed through the paper inlet 16 to the internal paper guides 9a and 9b of the paper feeder box 4.

When the paper magazine 2 reaches and presses the pin 30 of the swing arm 28, as shown in Fig. 5, the swing arm 28 moves about the pivot pin 29 and the annular recess 5 of the paper magazine 2 comes in engagement with the light blocking frame 11 as shown in Fig. 7.

As the swing arm 28 moves, the pusher plate 44 mounted to the lower of the swing arm 28 presses against the pin 42 of the engaging arm 36. More specifically, the pusher plate 44 holds the counter-force of the pin 42 as it is supported at the rear end with the stopper 46. As the pin 42 is pressed by the pusher plate 44, the engaging arm 36 moves in the same direction as of the swing arm 28 and its notch 38 releases the pin 35 of the lever 34. The lever 34 is thus turned down by the yielding force of the spring 26 mounted on the shaft 25.

As the lever 34 is turned down, the shaft 25 rotates and the lock cam 24 moves upward. The lock cam 24 then comes into direct contact with the lower side of the cam engaging projection 8 of the paper magazine 2 which travels just above the lock cam 24 at the moment.

Finally, as the paper magazine 2 is located in a given loading position determined by the positioning pins 12, its cam engaging projection 8 passed over the lock cam 24 comes at rear end in engagement with the lock cam 24 which have been turned upward in the lock direction by a combination of the weight of

the lever 34 and the yielding force of the spring 26 and remains urged by the same towards the paper feeder box 4.

In particular, the lock cam 24 is located in a midway between the two magazine guides 20 so that it can press the widthwise center of the paper magazine 2 towards the paper feeder box 4.

Accordingly, even if the paper magazine 2 is slightly misaligned with the magazine guides 20, it can hardly be biased but precisely secured in its loaded position by the holding of the positioning pins 12. The paper P will thus be prevented from winding during the feeding.

Since the paper outlet 6 is located in the lowermost of the paper magazine 2, it will rarely depart from the paper inlet 16 of the paper feeder box 4 when the paper magazine 2 is tilted backwardly due to the misalignment with the magazine guides 20. The paper P can also be forwarded to the advance rollers 10 with certainty and precision.

While the paper magazine 2 stays in its loaded position, it causes the plunger pin 14 to be retracted as resisting the yielding force of the spring 15.

For unloading the paper magazine 2, the handle 50 shown in Fig. 6 is lifted up. As the lifting up of the handle 50 causes the handle arm 48 to turn upward, the link arm 47 is actuated to rotate the shaft 25 in the direction of the arrow shown in Fig. 6. Simultaneously, the lever 34 is turned upward and its engaging pin 35 comes into contact with the guide edge 39 of the engaging arm 36. Subsequently, the engaging arm 36 moves about the center pin 37 in the direction of the arrow shown in Fig. 6 until its notch 38 comes close to the pin 35 of the lever 34. Then, the engaging arm 36 is addressed by the yielding force of the spring 40 causing its notch 38 to accept the engaging pin 35. As the result, the lock cam 24 is held in its unlock position, as shown in Fig. 5.

Then, the paper magazine 2 can easily be unloaded by departing from the paper feeder box 4 along the magazine guides 20. In addition, the plunger pin 14 shown in Fig. 7 provides an initiative force to the paper magazine 2 for ease of the unloading.

Claims

1. A support system for paper magazine, the support system comprising:
 - a support surface of an enclosure of an exposure unit on which a paper magazine having a paper outlet provided in the lower front side thereof and a cam engaging projection mounted to the bottom side thereof;
 - a paper feeder box disposed vertically at the front end of the support surface;
 - an upper paper guide and a lower paper guide both arranged over the support surface be-

fore the paper inlet of the paper feeder box and urged by springs for vertical swing movements;

a pair of magazine guides mounted on the support surface for guiding both sides of the paper magazine during the loading;

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a lock cam mounted between the two magazine guides and below the support surface for swing movements to engage with and disengage from the cam engaging projection of the paper magazine and urged by the yielding force of a spring to press the cam engaging projection towards the paper feeder box;

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a swing arm provided beside the passage of the paper magazine for return movement by the yielding force of a spring which is triggered by the loading of the paper magazine; and

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a lever holding mechanism for holding the lock cam in its unlock position after the return movement of the swing arm is completed.

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Fig.1

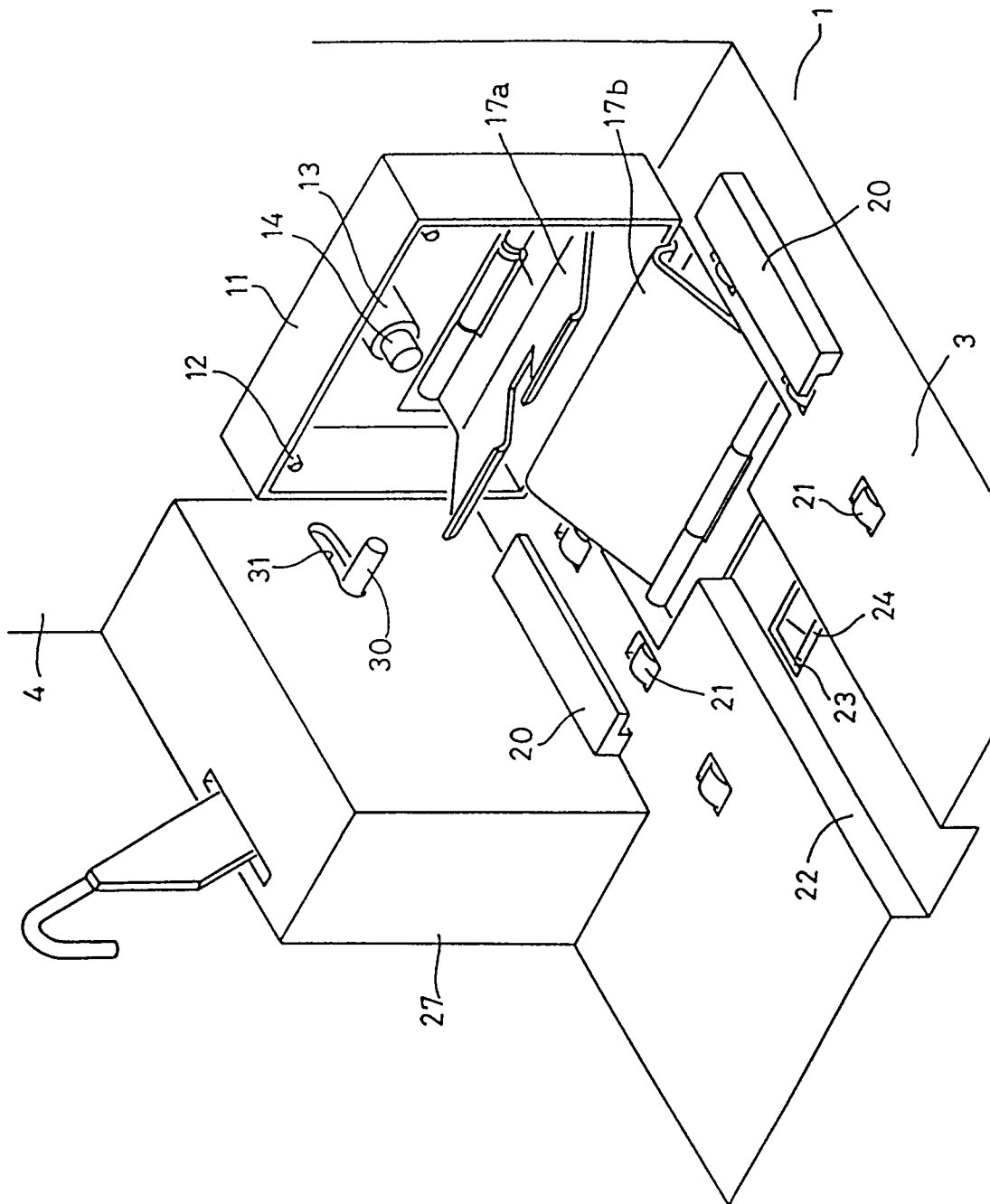


Fig. 2

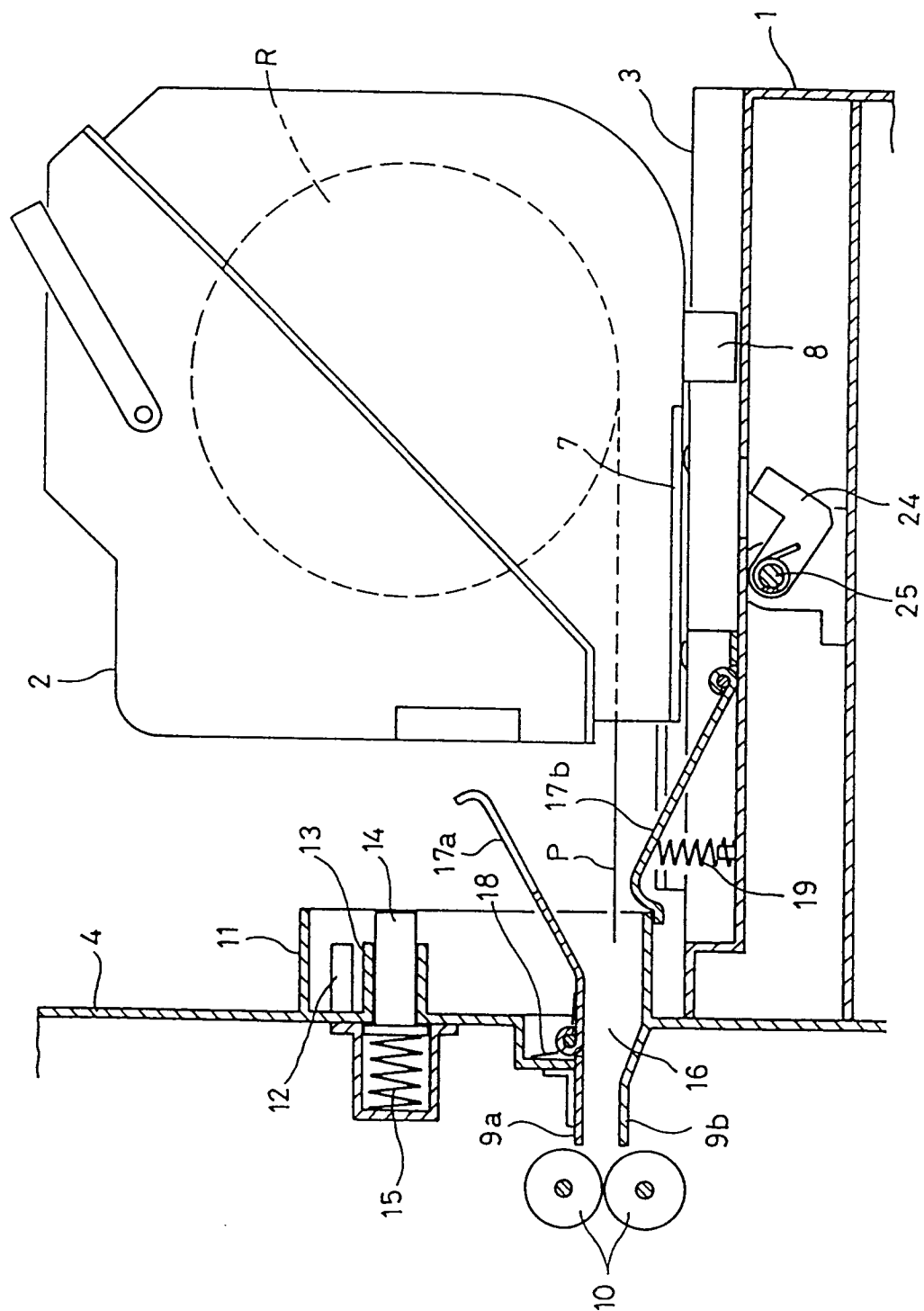


Fig.3

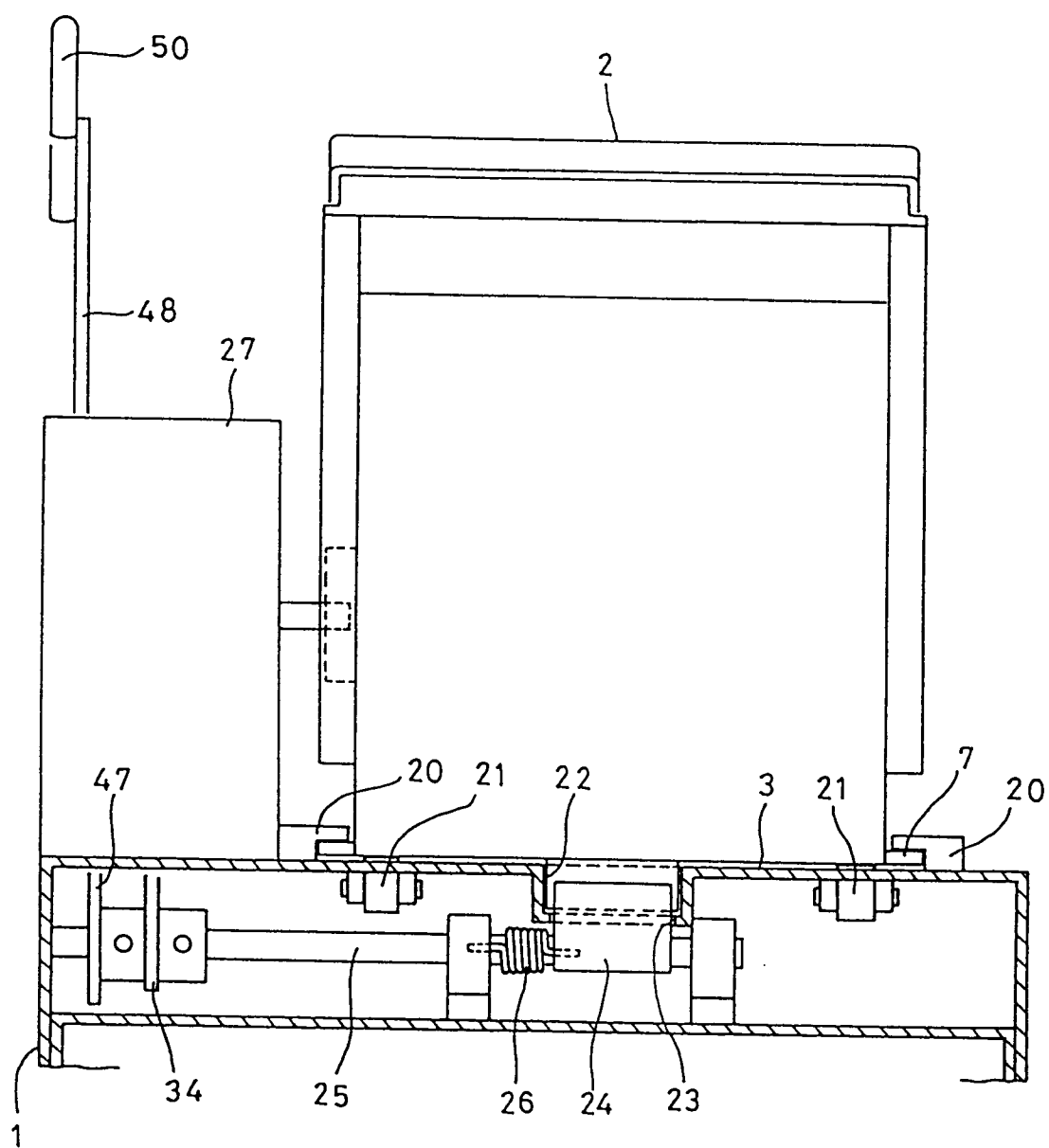


Fig. 4

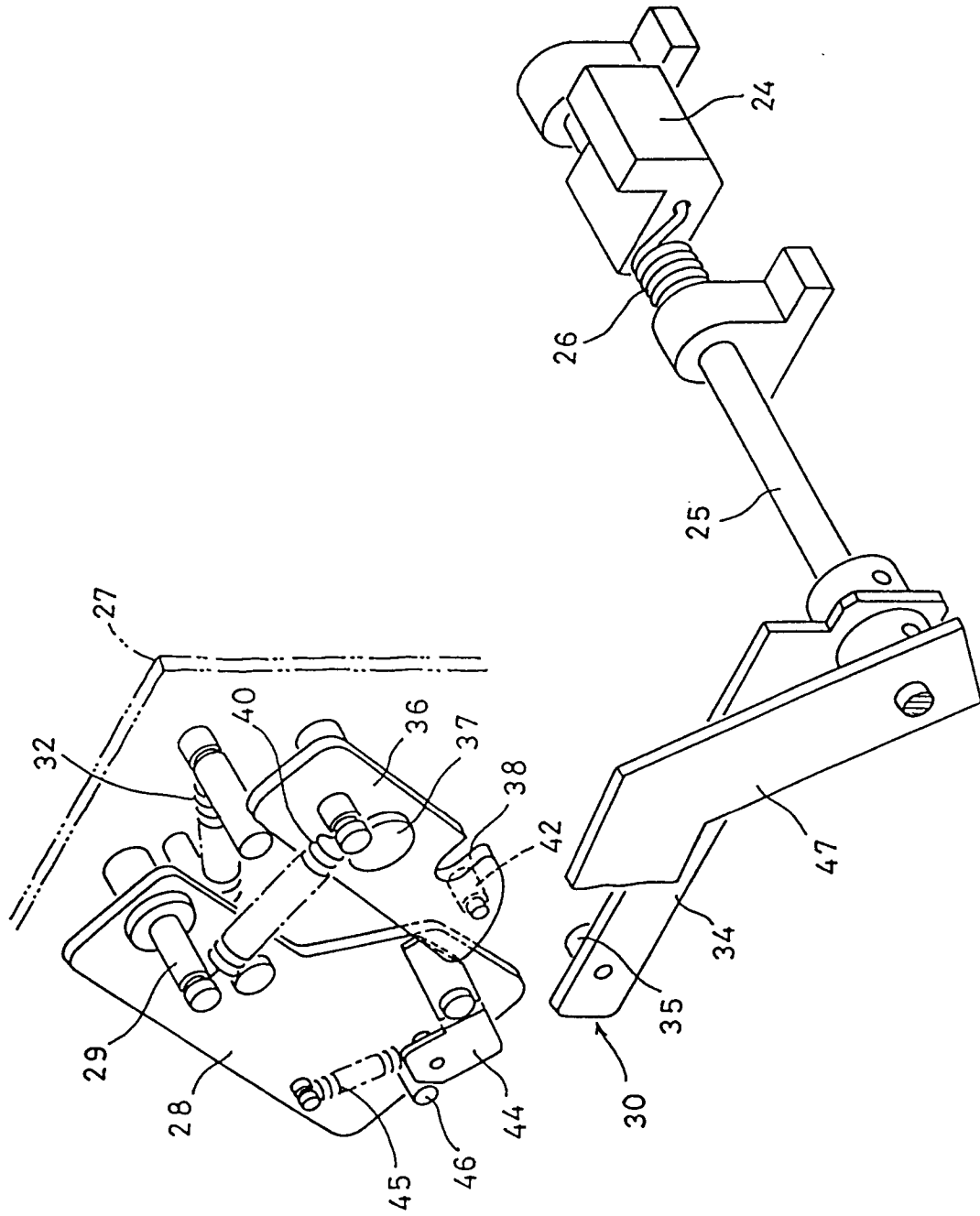


Fig. 5

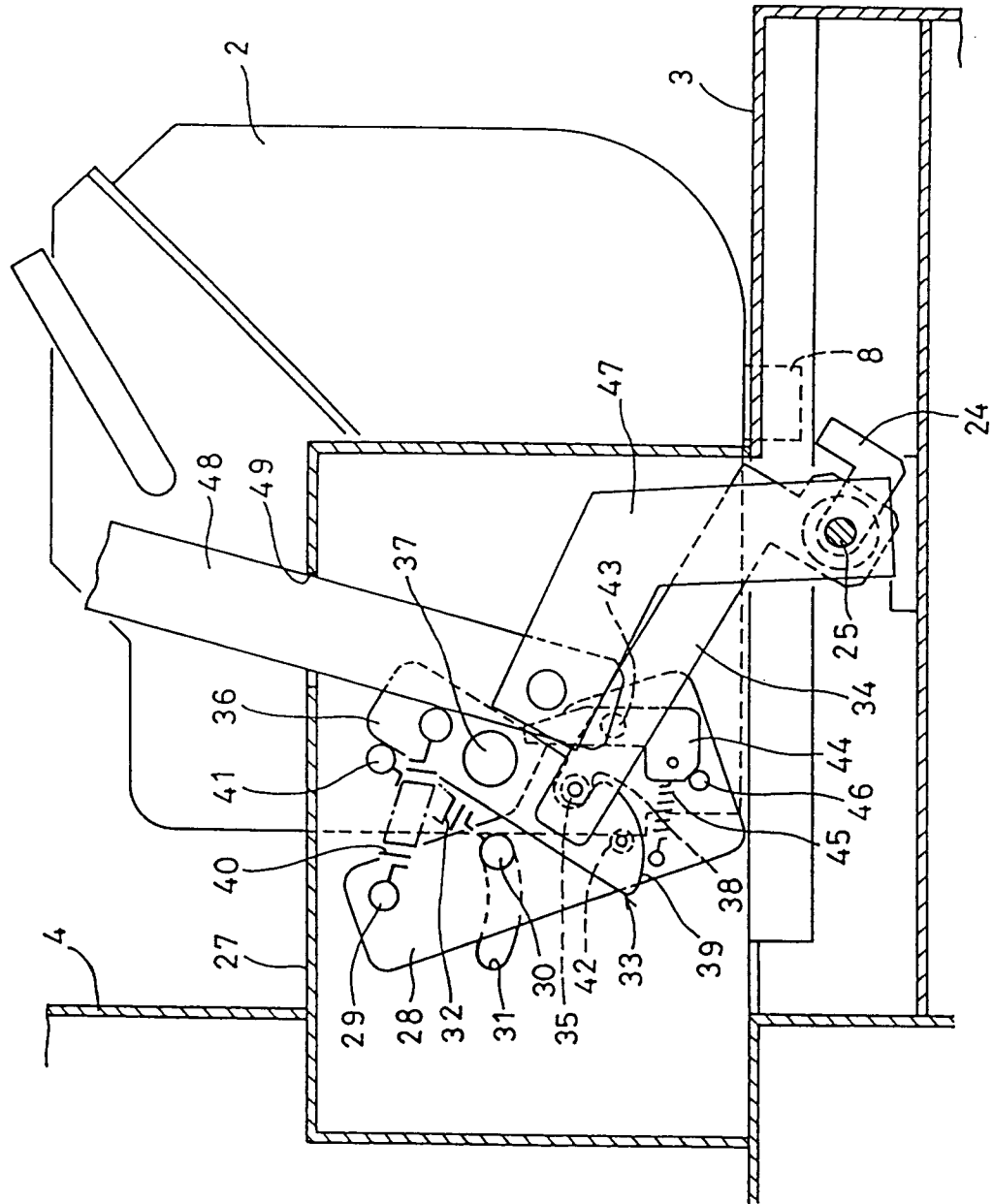


Fig.6

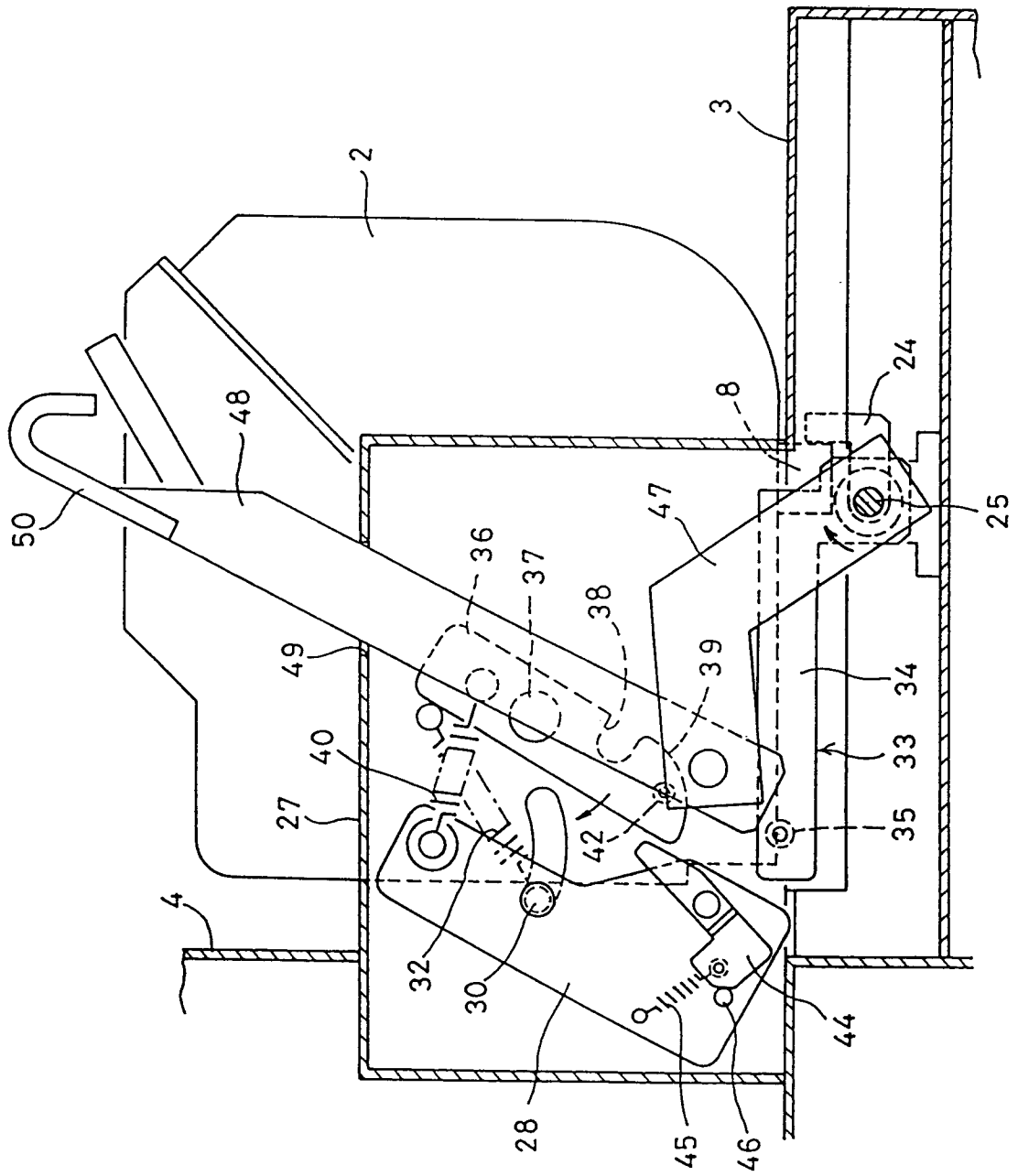
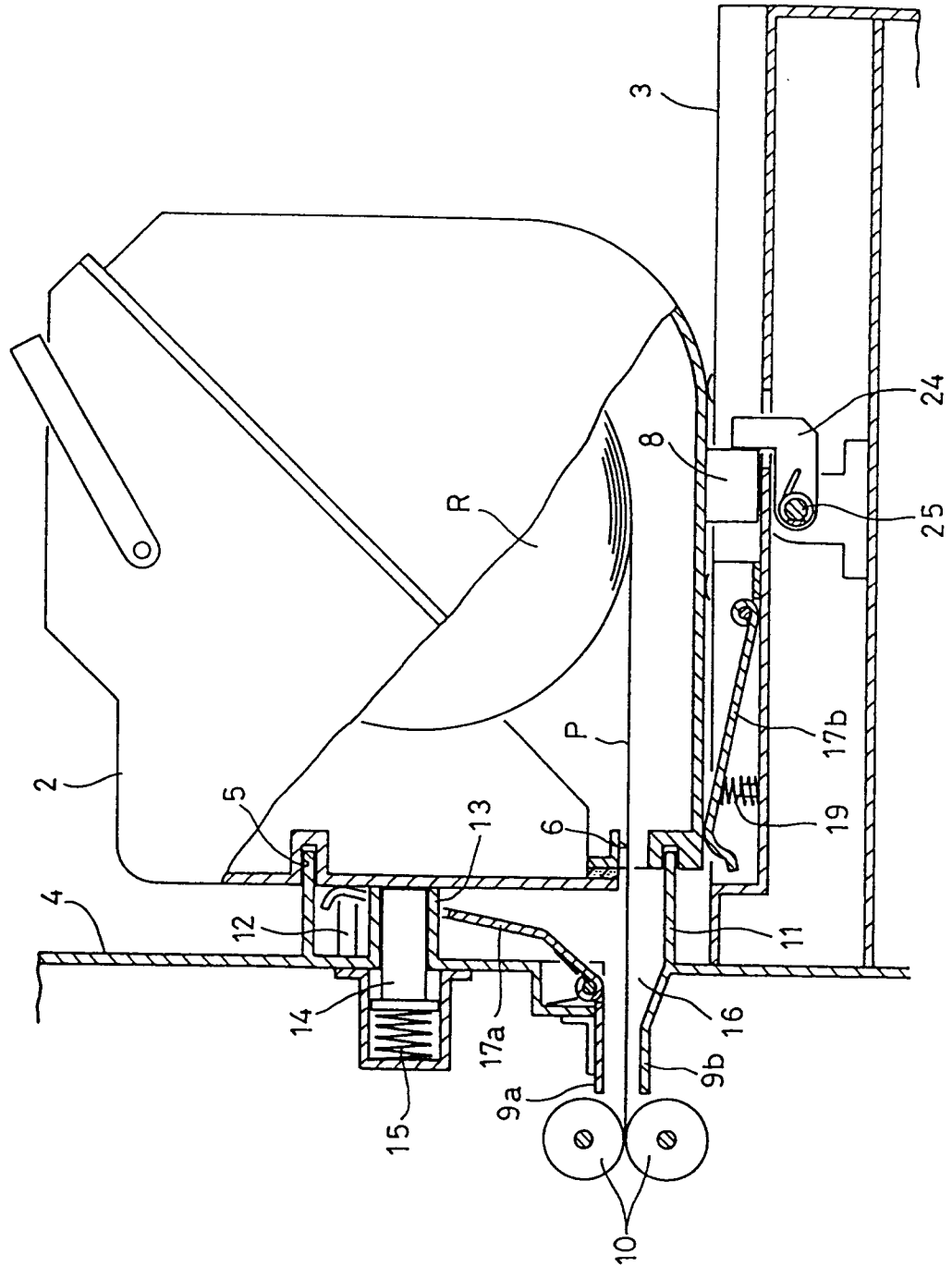


Fig.7





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 94 30 8321

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	US-A-3 622 095 (TURNER) * column 2, line 12 - line 70; figures 1-2 *	1	G03B27/58
A	US-A-5 187 531 (OZAWA ET AL.) * column 3, line 58 - column 4, line 46; figures 1-3 *	1	
A	US-A-5 181 066 (OZAWA ET AL.) * column 4, line 1 - line 65; figure 2 *	1	
A	GB-A-2 139 984 (NORITSU KENKYU CENTER) * abstract; figures 4-6 *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			G03B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 24 February 1995	Examiner Deroubaix, P
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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